

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1.-15. (canceled)

16. (currently amended) A method for transmitting optical polarization multiplex signals, the method comprising:

converting a first binary signal into a first optical signal;

converting a second binary signal into a second optical signal polarized orthogonally to the first optical signal;

combining the orthogonally polarized optical signals into a polarization multiplex signal; transmitting the polarization multiplex signal;

dividing the polarization multiplex signal at the receiving end into two orthogonally polarized signal parts;

converting each polarized signal part in a linear manner into a complex signal;

feeding the complex signals to a multidimensional filter whose coefficients are controlled in such a way that signals which have been reconstructed independently of the polarization of the received polarization multiplex signal and which correspond to the optical signals are fed out at the filter outputs, and

~~that demodulating and converting the reconstructed signals are demodulated and converted into binary signals at the receiving end, wherein~~

a data signal is converted by a serial-to-parallel conversion into a multiplicity of binary signals, the data signal having a higher rate than the multiplicity of binary signals.

17. (previously presented) The method according to Claim 16, wherein each polarized signal part is converted linearly into a complex electrical signal having two orthogonal components, and wherein

its orthogonal components are fed to the controllable multidimensional filter which, from said orthogonal components, obtains the reconstructed signals in the form of reconstructed signal components.

18. (previously presented) The method according to Claim 17, wherein the polarized signal parts are converted into the complex signals or into the orthogonal components of the baseband.

19. (previously presented) The method according to Claim 16, wherein the binary signals are converted into optical multiphase signals.

20. (previously presented) The method according to Claim 17, wherein the binary signals are converted into optical multiphase signals.

21. (previously presented) The method according to Claim 16, wherein the first and second binary signals are converted by a four-stage differential phase modulation into an optical multiphase signal comprising the first and second optical signals.

22. (previously presented) The method according to Claim 17, wherein two binary signals are converted by a four-stage differential phase modulation into multiphase signals.

23. (previously presented) The method according to Claim 19, wherein with the application of four-phase modulation or four-stage differential phase modulation, demodulated signal components are generated by demodulating the reconstructed signals or their signal components, and wherein

the signal components of the demodulated signals are evaluated by threshold comparators and converted into binary signals at the receiving end.

24. (previously presented) The method according to Claim 21, wherein with the application of four-stage differential phase modulation, demodulating is carried out by vector-multiplying sequential reconstructed signal values or, as the case may be, their signal components, and wherein

the demodulated signal values are rotated through  $45^\circ$  or a multiple thereof, and wherein the associated signal components are converted by threshold comparators into binary signals at the receiving end.

25. (canceled)

26. (previously presented) The method according to Claim 16, wherein the optical signals are transmitted phase synchronously.

27. (previously presented) The method according to Claim 21, wherein the filter coefficients of the multidimensional filter are obtained from errors of the demodulated signals.

28. (currently amended) The method according to Claim 21, wherein the filter coefficients of the multidimensional filter (16) are obtained from errors of the decoded signals.

29. (previously presented) The method according to Claim 16, further comprising:  
measuring the signal quality; and  
compensating signal distortions in the complex signals and/or reconstructed signals.

30. (previously presented) The method according to Claim 16, wherein signal distortions are compensated by controlling the filter coefficients of the filter.

31. (previously presented) The method according to Claim 16, wherein the orthogonal components, having been digitized, are processed in a controllable digital filter to obtain the reconstructed signals.

32. (previously presented) The method according to Claim 16, wherein the orthogonal components are processed as optical signals in a controllable optical filter to obtain optical reconstructed signals.

33. (currently amended) A method for transmitting optical polarization multiplex signals, the method comprising:

converting at least a first binary signal (~~A, B~~) into a first optical signal (~~QPS1~~); and

converting at least a second binary signal (~~D, C~~) into a second optical signal (~~QPS2~~) polarized orthogonally thereto and the orthogonally polarized optical signals (~~QPS1, QPS2~~) are then combined into a polarization multiplex signal (~~PMS~~) and thereupon transmitted, wherein

the polarization multiplex signal (~~PMS~~) is divided at the receiving end into two orthogonally polarized signal parts (~~PS1, PS2~~), wherein

each polarized signal part (~~PS1, PS2~~) is converted in a linear manner into a complex signal ( ~~$I_1 + jQ_1$ ;  $I_2 + jQ_2$~~ ), wherein

the complex signals ( ~~$I_1 + jQ_1$ ;  $I_2 + jQ_2$~~ ) are routed to a multidimensional filter (16) whose coefficients ( ~~$C_{ii}$~~ ) are controlled in such a way that signals ( ~~$I_{11} + jQ_{11}$ ;  $I_{12} + jQ_{12}$~~ ) which have been reconstructed independently of the polarization of the received polarization multiplex signal (~~PMS~~) and which correspond to the optical signals (~~QPS1, QPS2~~) are fed out at the filter outputs, and

that the reconstructed signals ( ~~$I_{11} + jQ_{11}$ ;  $I_{21} + jQ_{21}$~~ ) are demodulated and converted into binary signals (~~AE, BE; CE, DE~~) at the receiving end.